

University of Groningen

The dynamics of natural gas supply coordination in a New World

Boon von Ochssée, Timothy Alexander

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Boon von Ochssée, T. A. (2010). *The dynamics of natural gas supply coordination in a New World: cooperation or competition between gas-exporting countries from a Russian perspective*. [Thesis fully internal (DIV), Rijksuniversiteit Groningen]. Clingendael International Energy Programme .

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Chapter 1

Introduction

1.1 Research background

Cooperation with other gas-exporting countries could help Russia play an important role in safeguarding Russia's economic security, and by extension, its role in a changing international political system. The overall international political and economic context in which Russia finds itself has changed significantly since the end of the Cold War. Today, as the toll of the 2008-2009 international financial and economic crisis becomes increasingly visible, the important international political powers affected by it are discovering that it has, arguably perhaps, marked the beginning of a new chapter in post-Cold War history.

To be sure, great power nationalism and the clashing of interests and ambitions are now again producing alliances and counter-alliances, elaborate dances and shifting partnerships, that as Kagan notes, "a nineteenth-century diplomat would recognise instantly" [Kagan 2008a, p. 12]. The emerging general, global consensus is that, with the onset of the crisis' aftermath, the United States (US) is no longer capable of acting as the world's sole superpower. Past are the days when the US could act, much on the basis of its own agenda, in its ability to shape the world around it, especially when it came to globalisation and free trade. Barely a decade ago, as the 1990s drew to a close, the world seemed very different, when with the collapse of the Soviet Union, and the apparent embrace of democracy by Russia ushered in an era of global convergence [Kagan 2008a].

Then, the US was seen as the centre of a globalising world, characterised by the paradigm of free trade and free market capitalism. This paradigm was embodied by the Washington consensus, which set the rules of the game in the international political and economic system on the basis of US interests and institutions. The notion of a post-Cold War world governed by the rules of the victor of the Cold War appeared warranted with the onset of the further globalisation of economic growth during the 1990s and the revolution in new communication technologies. It would also be too early to claim that the US has entered a period of decline, and that one can now perceive it as an apologetic power in decline, that seeks to abandon its role as a global power [Läidi 2009].

Since the collapse of the Soviet Union, the geopolitical make-up of the Eurasian continent, where the bulk of the world's resources and population is located, has very much been in flux.

Flanked by the rapid economic rise of China on the one hand, and an expanding Euro-Atlantic community³ on the other, Russia is striving to form its own identity. If this view of the world is a canvas, then the picture of Russia drawn upon it is that of a rapidly emerging and important regional actor in Eurasia. Russia aims to become a pole between the growing economies of Asia, primarily China, and the Euro-Atlantic community [Le Monde Diplomatique 2009b].

Russia is unlikely to be able to become a power in the same manner as the US and China, powers with truly—and in the case of China potentially—global reach [Läidi 2009]. Because of its geographic location, Russia's positioning and self-perception is inherently shaped by geopolitical calculations. This perception of the world has returned to shape Russia's foreign policies and those of other countries. During the early 1990s, such calculations were assumed to have vanished with the disappearance of Cold War geopolitical competition between the two superpowers. Defeated, and badly weakened in the wake of the Soviet collapse, Russia retreated unto itself during much of the 1990s, leaving a geopolitical vacuum.

Having recovered from the economic abyss of the 1990s and resentful of the crumbling of its former spheres of influence, Russia now aims to go beyond merely protecting its own integrity. Since 2000, Russia's leadership, bent on modernising Russia and protecting its spheres of *interest* rather than spheres of *influence* per se, has also sought to reassert Russia's role on the international arena [Trenin 2009]. It is in Russia's perception that much has changed during the two decades since the end of the Cold War. Russia's perception of the international political system either as a geopolitical zero-sum game or a world of economic interdependence is bound to affect its course. Ultimately, the course it takes in global politics will, through Gazprom, affect a globalising gas market. Russia and the US at times act as rivals and at others as partners, while the true global economic and geopolitical 'critical mass' in the international political system is coalescing around the US and China, followed by the European Union (EU) and other emerging countries.

In Russia's perception, gas may hold the promise for consolidation of its position as a geo-strategic power in this changing international political system as it re-balances and aligns its relations with the West. The rising economic and strategic importance of gas lends salience to this perception. In addition, the revenues from these resources offer the means to modernise Russia's military and industrial complex and provide social stability and wellbeing for the Rus-

³ The 'Euro-Atlantic' community consists of the US and the EU as well as NATO member states. This term is used to refer to transatlantic relations between the US and its European allies, most which are also NATO members, but not all NATO countries are EU member states and vice versa. Hence the term 'Euro-Atlantic' refers to values and institutions shared by all these countries, also used interchangeably with the 'West', especially when it comes to relations between Russia and the US and Europe.

sian population [Balzer 2005]. For the Russian state, gas export revenues offer economic security during the decades to come, just as oil has been up to today.⁴ Oil, as a resource that Russia possesses in smaller amounts than in the case of gas, will play an important role throughout the coming decades.

Energy is an asset that has kept Russia and its Soviet predecessor in the top ranking of most powerful nations on the globe [Laïdi 2009]. However, the Russian leadership appears aware of the limitations of this asset. Indeed, Russia also desires economic diversification and modernisation, in an effort to shift away from a resource-dependent economy, as Russian President Dmitri Medvedev's late 2009 speech reflects: "the nation's prestige and welfare can't depend forever on the achievements of the past, all that has kept the country afloat, but is rapidly ageing" [Financial Times 2009b]. Hence Russia struggles with the notion of making economic diversification a reality. In economic terms, Russia's Gross Domestic Product (GDP) contribution to global GDP is only 1 percent, compared with the US' 22 percent GDP contribution [Laïdi 2009].

Accountable to the Russian government, as a semi- or quasi-state owned national energy firm, Gazprom is the caretaker of Russia's gas endowments.⁵ As in many gas-producing and exporting countries, Gazprom is tasked with the maximisation of the value of the country's gas resources. Gazprom is—as Russia itself has been and still is—undergoing a fundamental transition away from its Soviet past. While Russia is the leading actor in international relations at the state level, it is Gazprom, as an important actor for the Russian state at the firm level⁶ that must deal with uncertainties and competition in the interregional gas market. Since the 1960s, the domestic gas market also expanded, and for Russia the main question is *when* to develop and export the resources to satisfy both domestic and foreign needs for gas; while also serving socio-economic priorities.

The company aims to shift away from its origin as a regional gas exporter to Europe towards a truly global one, which can have an impact on interregional gas flows. At the same time, the

⁴ Increasingly, Russia is focusing on the development of a gas-based industry in order to export (semi-)products for fuelling and diversifying its economy. However, this study concentrates on gas as a basic feed-in product.

⁵ Against the backdrop of record-breaking energy prices over the four years leading up to August 2008, the Russian State began a process of restoring majority government control and ownership over the Russian gas (and energy) sector through Gazprom [Åslund 2007a].

⁶ In the context of this study, while the 'state' as an entity pertains to an entire nation, including the government, population and its natural resources, the term 'government' is employed here and in other chapters to refer to the decision-making power of the government itself, often as a stakeholder in firm-level affairs, i.e., as a decision-making body responsible for state affairs, particularly in gas producer countries. The firm is ultimately accountable to a government rather than the state as a whole. The government takes up a special role in this regard, distinct from the state as such. Though the state plays an important overarching role for both governments and firms, the terms 'state-owned' and 'government-owned' will be used inter-changeably, even though in effect it is the government of gas-producing and exporting countries which owns and controls quasi- or state-owned companies.

adequate supply of the domestic Russian gas market is a major political priority for Moscow. Gazprom must therefore live up to its public service obligation (PSO), supplying gas at (current) domestic prices below (current) costs of delivery to market [Stern 2009b]. Since the early 2000s Russia itself has been confronted with a complex chess game to regain control of the gas value chain in Russia's 'backyard', control over which was lost with the collapse of the Soviet Union and the ensuing politico-economic chaos of the 1990s.⁷

As it seeks to become a more global player, Gazprom must also take into account the challenges posed by an increasingly interregional gas market, where it faces uncertainty in terms of demand and potential competition from other gas-exporting countries. The term 'interregional' is used to refer to the idea that, while gas is still largely traded on a regional basis, the increasing amounts of Liquefied Natural Gas (LNG), made available over the last decade, flow between these regional markets and between the regional gas markets and more distant suppliers. In the mean time, while LNG trade increasingly takes place between regions, hence the term *interregional*, the gas market is in that regard far from entirely *global*, especially when compared with the world oil market; hence the term 'interregional' is preferable over 'global'.⁸ This market, actually composed of several, previously isolated regional gas markets, has steadily become more interregional in nature, owing to the continued advent of LNG. Russia has the geographical advantage of being located between the world's largest energy consuming regions: Europe to the west and East Asia to its east [Bahgat 2009]. The gas market is still in an early phase of its evolution and the industry's development has a long road still ahead of it.⁹

A number of gas-exporting countries play important roles as regional gas suppliers. These include not only Russia and Qatar, but also Canada, Norway, the Netherlands, Algeria, Turkmenistan, Qatar and Indonesia. Structural changes within the regional gas markets, in the US, Europe and Asian-Pacific regions have precipitated the rise in LNG flows during the 1990s and 2000s. In addition, Asia, which includes mature gas markets such as Japan and emerging gas markets, such as China and India, will offer most of the growth opportunities in relative terms. More flexible forms of LNG (and pipeline) trade are changing the geography of the

⁷ Gazprom faces this situation even as the geopolitical makeup of the Eurasian continent continues to change (in this context, the term 'regional' refers specifically to Russia's post-Soviet space, and its place within Eurasia). When the Soviet Union collapsed in 1991, so did the centralised system of oil and gas production and exports of the Soviet empire [Victor et al. 2006; CIEP 2008]. Combined with this general collapse, the partial privatisation of the Russian gas sector during the 1990s effectively further reduced the government's grip on the sector's windfall profits [Åslund 2007].

⁸ There are also important differences within regional markets, at a sub-regional level, i.e., between the regional and country levels. Because of important sub-regional discrepancies, the term *intra-regional* is also used to highlight developments that occur within or separately from the regional level.

⁹ In gas market terms, the short-run generally refers to a number of years, up to 2015 at this writing. Short-term trading also occurs on a daily basis in some gas markets. From a gas industry investment perspective, however, the short-term is in the order of several years, the medium-term is set roughly between 2015 and 2025. The long-term can be considered to be in the order of several decades, i.e., beyond 2025. The same roughly holds for other contexts in which the words short-, medium- and long-term are used in this study.

interregional gas market, even as they continue to exhibit diverging regional pricing and trade patterns. As the projected import-dependency of various regional gas markets increases, so too will additional export opportunities for gas-exporting countries at large, including of course Russia.

Russia, Iran and Qatar together hold over half the world's proven conventional gas reserves [BP 2009]. The concentration of gas resources in so few countries predisposes the interregional gas market to an oligopolistic market structure. What most gas-exporting countries have in common is that they seek to become more global, securing access to and tapping new gas markets. However, all these countries have evolved at uneven paces and differ extensively along the lines of their levels of economic diversification as well as in terms of economic absorption capacities and export strategies. Currently, Russia, Algeria and Norway export gas mainly to Europe by pipeline, Canada exports gas exclusively to the US, while Indonesia, Malaysia and Brunei export mostly to Japan. As a newcomer, Australia exports gas to a number of Pacific markets, as well. With its recent meteoric rise as the largest LNG exporter in the world, Qatar has embarked on an LNG export campaign. Qatari LNG now flows to almost every corner of the globe. By sharp contrast, Iran's gas is largely consumed domestically, while gas from Central Asian countries¹⁰ is forcibly landlocked.

The trend of gas market oversupply, against the background of the financial and economic crisis of 2008-2009, fundamentally changes the picture held during the mid-2000s of scarcity in a seller's market. The crisis has caused a significant amount of regional gas demand destruction. Because during the preceding years interregional LNG trade has become more flexible and versatile in the seller's market, regional supply patterns in Europe, for example, are increasingly affected by developments in the US and elsewhere. With unconventional gas in the US affecting the interregional LNG balance, supplies and prices in Europe are affected because of flexible LNG volumes.

¹⁰ Although Russia and Iran are Caspian Sea littoral states, in this study the 'Caspian region' is used to cover Kazakhstan, Uzbekistan, Turkmenistan, and Azerbaijan. Central Asia is defined here as the region consisting of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. For the purpose of this research, gas issues regarding Kyrgyzstan and Tajikistan will not be addressed. These countries are very minor gas producers and consumers, smaller than 1 bcm/y. Since the 1990s, Uzbekistan was the main exporter to these countries. From 2003 onwards, contracts have been signed with Gazprom. Moreover, Kyrgyzstan and Tajikistan play a very minor role in gas transit, only possibly for Caspian exports to China [Stern 2005; Pirani *et al.* 2009]. The three main exporters east from the Caspian Sea are all landlocked producers, encapsulated in the North by Russia, in the West by the Caspian Sea and the Caucasus, Iran and Afghanistan to the south and their Tajik and Kyrgyz neighbours to the East, and beyond these lie the emerging gas-importing economies, China and India. The Caucasus region includes parts of southern Russia, Azerbaijan, Georgia, Armenia, Turkey and north-western Iran.

From a seller's market during the period of 2004-2008, we therefore now witness the opposite.¹¹ These developments demonstrate that a seller's market and times of scarcity can never be taken for granted by suppliers and convey the considerable amount of downside risk involved in the gas market. The level of interregional integration amongst major regional gas markets is now such that price effects are felt between regional gas markets in the short run with day-to-day prices in the US affecting developments in Europe and vice versa. The context in which investment decisions are made has therefore fundamentally changed with the aftermath of the 2008-2009 financial and economic crisis. The crisis has primarily caused an adverse demand-side shock, calling into question whether the supply side cannot somehow be better managed or coordinated by gas-exporting countries to prevent such oversupplies in the future.

It is remarkable to note that, during the seller's market years of 2006-2008, especially in the aftermath of the Russia-Ukraine gas row of early 2006, and Russo-Algerian gas talks later that year, politically sensitised talk about cartelisation in the gas market was rife, especially in Europe. The topic even gained attention in the mainstream media, with the appearance, for example, of an article on cartelisation in the gas market in *The Economist* in April 2007. This article summarily noted that, with the prevalence in the gas market(s) of long-term gas contracts and the lack of a global price for gas, a Organisation of the Petroleum Exporting Countries (OPEC) for gas, or a 'gas OPEC', would be difficult to achieve [The Economist 2007].

Indeed, this brings us to the direct comparison between OPEC and the Gas Exporting Countries Forum (GECF). With gas market cartelisation being the 'talk of the town' during the seller's market years of 2006-2008, the GECF received quite some spotlight at the time, being alluded to as an OPEC in the making. For many, a 'gas OPEC' therefore loomed on the horizon for Western economies. The appearance in late 2006 of a confidential North Atlantic Treaty Organisation (NATO) report (which was 'leaked' to the press) warning European NATO member states of Russia's imminent attempt at orchestrating the formation of a 'gas cartel' that threatened European energy security [Financial Times 2006] fuelled this ongoing debate. These fears are largely the result of security of gas supply concerns. Curiously, during the aftermath of the 2008-2009 global economic and financial crisis, the debate over and fear of gas market cartelisation melted away from the agenda.

Nonetheless, member states of the GECF, including Russia, publicly expressed greater commitment to cooperation, and Russia, Iran and Qatar formed the so-called Gas Troika in late 2008. How does the nature and functioning of gas trade, especially in its rigidity through

¹¹ A large part of this study has been written in the context of a seller's market for oil and natural gas. This period lasted from the mid-2000s to the autumn of 2008, while from the subsequent year onwards a buyer's market has resulted. Account is taken of buyer's market conditions throughout the study, even though the reader may encounter streams of thought pertaining to the prevalence of a seller's market.

long-term contracts and the evolutionary phase of the interregional gas market, impact the shape and form of a potential ‘gas OPEC’? The motive for gas-exporting countries to cooperate is obvious: oversupply, in whatever way or form, is always undesirable. In addition, the interregional LNG industry, and to a limited extent also in the case of pipeline gas, the rise of new business models is precipitating more flexible LNG trade, and thus more uncertainties.

In light of the increased flow of LNG to Europe and the 2008-2009 financial and economic crisis, Gazprom must take into account the impact of new gas flows in its current main European gas export market(s), both in the short and long term. Through its position as a pipeline gas supplier to Europe, Russia is able to affect the interregional gas balance. While Russia could compete with other gas-exporting countries to secure market share, this approach could also backfire, leading to regional gas oversupplies if other gas-exporting countries pursue similar ambitions. Demand may always collapse, thus dampening export earnings. This in turn underlines the importance of a wait-and-see strategy, i.e., delaying investment decisions.

In this particular context, the use of a so-called real-option game approach, such as the one in Smit and Trigeorgis [2004], which will be pursued in this study, offers intuitive insights about the value of Gazprom’s investments under conditions involving both uncertain future gas demand and possible decisions of rival gas exporters. According to the model, which will be developed in Chapter 8, the decision to whether or not to invest leads to certain outcomes. These results may involve competition or cooperation, partially as a function of various market outcomes. An important aspect of the model therefore is that uncertainty in demand *and* dynamic gas market developments (in terms of competition) can be taken into account. Thus the model is not a product of thinking under conditions of scarcity *per se*, when no need for cooperation appears necessary. The model also incorporates the thinking that would prevail under conditions of a possible demand cave-in, such as is being witnessed in the aftermath of the 2008-2009 financial and economic crisis. The real-option game approach lends itself well to the post-2008 air of uncertainty across regional gas markets.

Because of the complexity of the interregional gas market and the fact that gas has yet to experience a further evolution in its product lifecycle, in this study we focus primarily on Cournot-type quantity competition, where suppliers are assumed to compete in quantities, or gas volumes, rather than in gas prices.¹² That firms compete in the first instance on the basis of capacities, before way is given to price competition, coincides with a widely held view in industrial organisation [Tirole 1988; Jacquemain 1987]. Indeed, this study is not only about the economic-strategic aspects of cooperation between gas-exporting countries. It is also concerned

¹² However, the issues of pricing and trade patterns have also a fundamental impact on the development of the interregional gas market, and will therefore be discussed in a qualitative manner.

with the political dimension that is inevitably involved. Russia's abstention from full OPEC membership hints at its desire to protect its policy independence. Even so, in the world gas, Russia possesses roughly a quarter of global reserves, while it possesses only 6 percent of global oil reserves [BP 2009]. If feasible, cooperation, collusion¹³ or other forms of coordination in the interregional gas market must also suit Russia's interests, in light of its self-perception as a great power.

An important issue is Russia's perception. How it perceives the outside world and what kind of world order it desires, profoundly affects its choices. The role of the US is important insofar as Russia's ambitions are concerned in the gas market(s). US perceptions of the (monopolistic) control of the natural resources by other powers in Eurasia, such as Russia, underpin the US drive to counterbalance such powers. Such control is seen by the US as a long-run threat to its own global power base, and contravenes the US ideals of free, open trade and access to resources.¹⁴ Despite the relative decline of absolute advantages in the post-Cold War world, America's geo-strategic imperatives remain [Blank 2007]. The geo-strategic implications of this US view directly also constrain Russia's room for maneuver in influencing the size and direction of gas flows. The US and NATO effort to establish a long-run presence in Afghanistan epitomises Western concerns over long-run access to energy flows in and from Eurasia.¹⁵

1.2 Research objective and research questions

As the pursuing chapters will illustrate, an integrated political and economic approach to Russia's potential cooperation with other gas-exporting countries, that takes into account the discussion above, is currently lacking. From a political as well as an economic point of view, and in the interest of academic thought, a proper investigation as to whether Russia is able to collude with other gas-exporting countries and in what way, is a topic that merits further academic analysis. Research on this topic helps us better understand international gas market developments. Little research has been done on the boundary solutions for cooperation between Russia and other gas-exporting countries, particularly in light of the geopolitical complexities involved. This study can help shed some light on the economic and political dimensions of such cooperation. The central research objective for this study is:

¹³ Collusion is an agreement, usually but not always covert, which arises between firms (and in this case, quasi- or fully state-owned firms) where markets are divided or where prices and/or supplies are in some way coordinated upon in the interest of suppliers. See Chapter 4 for an overview of the theory, definitions and types of collusion and cooperation in this regard.

¹⁴ Claims made in 2008 by US officials such as Matthew Bryza, former US Deputy Assistant Secretary of State for European and Eurasian Affairs, typify US concerns over Russia's potential ability to cooperate with other gas-exporting countries: "the concept of a [gas] cartel that involves Russia and Iran is deeply troubling. It moves against our hopes of realising a market-based partnership on energy that is mutually beneficial. We hope a cartel is not realisable" [AGC 2008b].

¹⁵ Energy security at large and the control of oil and gas transport routes have become important focal points for US strategy and its desire to maintain the status quo in the global balance of power [Le Monde Diplomatique 2009a]. Indeed, the US exerts considerable pressure on Afghanistan and Pakistan (referred by the late 2000s as the 'Afpak' region) to remain in the pro-US sphere of influence, primarily in order to ensure a US sphere of influence in the entire region [OSCE 2006].

Research objective

To identify what shape and form of cooperation with other gas-exporting countries is feasible from a Russian vantage point, as well as to what extent and how it can strengthen Russia as a geo-strategic player in the structure of the post-Cold War international system.

In order to pursue this objective, the following research questions are specified to disentangle the complexity of the politico-economic nature of Russia's potential cooperation with other gas-exporting countries:

- 1) In a globalising world with interdependent actors, does Russia seek to become a geo-strategic player in the structure of the international political system? What is Russia's perception of this structure and interdependence and how does this perception affect its dealings with the outside world?
- 2) If gas is to play an important role in Russia's post-Cold War ambitions, how is the gas market evolving and where, at the company level, i.e., Gazprom, does Russia stand? Which are the most important gas-exporting countries in a dynamic interregional gas market?
- 3) Based on the empirical analysis of a number of case studies, what factors influence Gazprom's gas investments? What are the main uncertainties and complexities Gazprom must deal with at the firm level?
- 4) Given Gazprom's and Russia's investment strategy, how and to what extent can collusion take place in an interregional gas market? How does Russia's perception of the international political system affect the desire for and feasibility of collusion or cartelisation?

Figure 1.1 Schematic chapter overview

1	Introduction	
2	A theoretical background: Agent-structure in a geopolitical context	
3	Russia's changing perceptions of the West and the role of gas	Part I
4	A theoretical background: Dynamic markets and collusion	
5	Interregional gas market structure, trade and pricing patterns	
6	The 'inner' gas market integrators	Part II
7	The 'outer' gas market integrators	
8	A real-option game approach to valuing gas value chain investments	
9	Gazprom's investment strategy in an uncertain, competitive gas market	Part III
9.1	Blue Stream pipeline case study	
9.2	South Stream pipeline case study	
9.3	Nord Stream pipeline case study	
10	Towards interregional cooperation between gas-exporting countries	Part IV
11	The geopolitical boundary solutions to strategic collusion	
12	Conclusion and discussion	

The answers to these sub-questions will help us to determine to what extent and in what form collusion amongst gas-exporting countries is possible, given Russia's post-Cold War perceptions of the system it inhabits. This study is organised into four parts, aiming in this manner to provide an answer to the different sub-questions, see Figure 1.1 for a schematic chapter overview.

Russia's tendency towards cooperation or competition in an interregional gas market hinges to a large extent on its gas export strategy. Within the context of this gas export strategy, gas export infrastructural projects play an important role. In order to understand the project-level evaluation within Russia's—and Gazprom's—gas export strategy and the relevant geo-economic and geopolitical developments, it is necessary to integrate macro-level aspects into project-level evaluations. In order to understand macro-level aspects, it is necessary to look at regional project-level evaluations, because of the regional, rigid character of gas transport. A substantial part of this study has been conducted in cooperation with a fellow PhD researcher, Mr. Tom Smeenk. His study, see Smeenk [2010], deals with Russia's—and Gazprom's—gas infrastructure investments in light of its gas export strategy, which goes hand-in-hand with developments at the level of market structure. Conversely, the present study deals with the market structure-level in the interest of discovering the boundary solutions for cooperation between gas-

exporting countries, with Russia as a focal point. In this research, gas export infrastructure at a project level plays a key role. Therefore, cooperation with Tom Smeenk has been extensive on the empirical front as well as on the theoretical one. Cooperation has resulted in chapters 4, 5, 6 and 10 being similar with respect to major elements to the corresponding part of Smeenk's [2010] study. Chapters 8 and 9 are identical to one another in both studies. The remaining chapters have been written independently, although the reader may unavoidably encounter similar lines of reasoning on various issues.

1.3 Overview of the study

This is not a study solely about collusion in the interregional gas market from an economic perspective, but also one taking into account the politico-economic context surrounding this issue; in particular from a Russian perspective. Since the end of the Cold War, this context has changed enormously, in both political and economic terms. Hence Part I, which contains two chapters, is designed to provide such an overall context, within which Russia is to form its integrated gas strategy, particularly with regard to some of the challenges it faces in this respect. Chapter 2 begins with a set-up of the theoretical instruments, designed to act as a theoretical toolbox for understanding what factors should be taken into account when analysing Russia's post-Cold War ambitions, perceptions and position in the international political system. This framework is inter-disciplinary given the nature of the research problem (involving natural resources and geo-strategic developments), it will be based above all on a geographic construct. As a field of study, geopolitics has an important place in this theoretical framework.

Within this framework, the behaviour of the various actors is based on different paradigms, consisting of utilitarian and constructivist theories. Links will be made to the notion of natural resource endowment of nations and the competitive advantages these offer. Also, the increasingly important role gas plays in international relations as a commodity of economic and strategic value is briefly explained. Chapter 3 then dives into the nature of the international political system as it has now evolved from the immediate post-Cold War years to the 2000s, and where Russia stands in this system and, most importantly, how it perceives the system and the role of gas. Hence Part I is designed to provide an answer to the first set of research questions mentioned in Section 1.2.

Designed largely to answer the second set of research questions, Part II addresses interregional gas market developments. Russia's gas strategy cannot be crafted in a vacuum without taking into account market developments. Therefore, at the level of the firm, Gazprom must take into account developments in a dynamic interregional gas market. Part II of this study is an overview of the functioning and structure of the interregional gas market and the most important gas-exporting countries. Chapter 4 deals with the current theoretical approaches on market developments, especially as far as the dynamic nature of markets is concerned. This chapter

also addresses the theoretical background to and preconditions for collusion as well as types of collusion (including cartels).

Chapter 5 is an overview of interregional gas flows and markets. Attention is paid in particular to regional gas markets, their structure and the nature of pricing in those markets. Chapters 6 and 7 collectively act as an overview of the so-called ‘inner’ and ‘outer’ integrators, respectively. The inner integrators are gas-exporting countries on the Eurasian continent which act as gas market integrators from within the Eurasian continent, mostly by pipeline. These include Russia and the Caspian Sea countries (former-Soviet republics in the Caspian region). The outer integrators are gas-exporting countries which are oriented more towards LNG exports. Together, the inner and outer gas market integrators will decisively shape the interregional gas market. Both chapters include an overview of institutionalisation issues, historical background and the production potential of the most important gas-exporting countries and their resulting gas export strategies in a dynamic gas market. This helps us better understand the gas-exporting suppliers which Russia must take into account. Chapter 7 also examines the market power of the various gas-exporting countries in an interregional dimension and the existing institutions for cooperation between gas-exporting countries. With this discussion complete, Part II will have answered the second category of sub-questions.

Part III is then an assessment of Gazprom’s investment strategy and how this strategy at the firm level may be linked to Russia as a state. The possibilities for cooperation in the interregional gas market are subsequently analysed. In other words, whether Gazprom may wish to compete or cooperate with other gas-exporting countries. The feasibility of collusion in the gas market(s) is to be assessed at this stage. This is done in light of the current and future possible (midstream)¹⁶ investment strategy of Gazprom for its growing export markets. Chapter 8 is an explanation of the real-option game model, by which the sequence of gas value chain projects should be assessed, in a quantitative framework. The model is preceded in Chapter 8 by a qualitative conceptual framework, which includes a discussion on the role of strategic investments, using what one knows from the practical conceptual perspective, such as Victor et al. [2006] have done.¹⁷ The conceptual framework concentrates mainly on midstream projects, in the sense that they may create an advantageous strategic position by expanding economies of scale both in gas transport infrastructure and in the value chain at large.¹⁸ These strategic in-

¹⁶ The term ‘midstream’ is used to describe mainly the segments of the gas value chain pertaining to the assets used to transport and distribute natural gas, such as pipelines and LNG tankers. Correspondingly, the up- and downstream segments of the gas value chain respectively pertain to the production and sale of natural gas.

¹⁷ Victor et al. [2006] have developed a conceptual framework in which they critically evaluate all the factors which come into play with regard to gas infrastructure investments, including transit risks, geo-economic and geopolitical factors, etc.

¹⁸ Economies of scale can be found either in the mid-stream (e.g., large diameter pipelines) or along the entire chain (e.g., large fields), taking into account that the associated costs of midstream infrastructures are capital intensive and sunk when the investment is made.

vestments feed back into the process of strategy-making as far as Russia's position in a dynamic interregional gas market is concerned.

In order to use the model to ascertain Russia's position vis-à-vis other gas exporters, the model is applied to three specific cases concerning midstream (pipeline) investment. Chapter 9 applies the real option game model in a duopolistic setting, combined with the conceptual framework to a number of cases, and aims to answer the third set of research questions. Since the international gas market is in fact still very (sub)regional, it is useful to break down the problem into separate case studies. The chapter is opened with a historical case, in order to provide an ex-post evaluation of strategic investments with the benefit of hindsight. Account is taken of growth markets, the level of competition, transit and other (politico-economic) uncertainties. This is done by examining Gazprom's plausible strategy first through a country-level lens, then through a sub-regional level lens. European (sub-regional) markets will be given specific attention in all three cases, because Europe is Russia's (and by extension Gazprom's) most important market.

Part IV, which contains two chapters, uses the analyses, lines of argumentation and empirically gathered information of all chapters in parts I through III to come up with an economic and geopolitical approach to cooperation amongst gas-exporting countries from a Russian perspective. Chapter 10 aggregates the analysis from a partially quantitative and sub-regional assessment of gas markets and Gazprom's investment strategy herein to a regional level; this will be done through a qualitative assessment. Chapter 10 will then proceed with a review of the scope for cooperation between gas-exporting countries in the interregional gas market. It will assess the implications of the model's applicatory outcomes for collusion between gas-exporting countries and what form this could take, given the theory discussed in Chapter 4.

Chapter 11 is designed to enable the reader to finally come full circle. Here the political and economic analyses, made in the first two parts and also in part III, are brought together to answer the fourth set of research questions regarding the feasibility of collusion from Russia's perspective (see Section 1.2). This will also be partially based on the analysis made in Chapter 10. In Chapter 11, however, the geopolitical boundary solutions to collusion are reviewed from a Russian vantage point. This chapter takes into account the possible geo-strategic challenges posed by the Euro-Atlantic community with regard to Russia's emerging gas strategy, which is important ultimately in determining to what extent collusion can be challenged, whatever its form. Chapter 12 summarises the main findings and tries to evaluate the research objective of the study. Additionally, it provides a discussion and recommendations and suggests further research.

1.4 Research methodology

The methodology applied in this study consists of a two-fold, multi-disciplinary approach. In Chapter 2, international relations theories are described, which are applied in chapters 3 and 11. Chapter 2 is in fact a review of the various international relations theories necessary to provide a complete analysis of Russia's position in international relations, which is done in chapters 3 and 11. This is a fully qualitative approach. Part II sees the use of a descriptive method, designed to bring together all the required facts, figures and other required information through reviews of literature and statistical information. Chapters 8 and 9 in Part III see the description and application of a quantitative model to analyse strategic interaction and to value investments in a real-option game setting, combined with an analysis based on a conceptual framework. In the form of a collection of three case studies, Chapter 9 applies the real-option game model quantitatively as well as within the conceptual, qualitative framework.

The previous explanation implies that the *empirical* research in this study has two main orientations. An important part is of a descriptive institutional nature. The part that concerns the evaluation of infrastructural investments is based on case-study analysis and is of an explorative nature. The multi-disciplinary nature of the research is highlighted by a combination of the use of different disciplines of both an economic and a political nature.

Among other issues, our analysis reveals that strategic capacity expansion projects typically include the option to postpone (wait-and-see). Therefore, a crucial element of strategic infrastructural planning in gas markets involves the timing of strategic investments, i.e., committing now vis-à-vis postponing to a later period. This timing aspect gains even more importance when uncertainty of future demand is considered simultaneously with competitive behaviour of (potential) rival suppliers in the market. This revelation has important implications for the analysis of potential cooperation amongst gas-exporting countries in an increasingly interregional gas market. The findings regarding the political dimension of this study also have important implications for the economic one.